GENERAL OPERATING PROCEDURES

for

DIFCO AIR DUMP CARS

Presented to

THE ALASKA RAILROAD CORPORATION

by

DIFCO, INC.
Findlay, OH

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GENERAL OPERATING PROCEDURES FOR DIFCO AIR DUMP CARS

I. SUPPLYING AIR FOR DUMPING

A. Sources of Air

There are three common sources of 120 psi compressed air for operating the DIFCO Air Dump Car: locomotive air compressor, separate air compressor and industrial plant compressed air. The locomotive air compressor is the most common source. This compressor feeds the locomotive's main air reservoir. With increased flexibility and added capacity, a separate air compressor can provide the necessary compressed air. Industrial plant compressed air can charge the air dump car's reservoir. Remember, 120 psi air pressure gives the best performance on DIFCO air dump cars. Monitor the air pressure.

Insure the compressed air sources have capacity to recharge the 200 gallon air dump reservoir on each DIFCO car. A sudden high demand for locomotive compressed air may significantly lower the main reservoir pressure. This delays the release of an air brake application as the locomotive air compressor recharges both the air brake and the air dump air reservoirs. Dumping many cars at once may require a separate air compressor to maintain the locomotive's main reservoir pressure.

B. When to Charge

Have the dump handles pushed in and latched when charging the air dump reservoir. This opens all the air dump cylinders to exhaust and prevents the car from dumping. Also, it positions the dump valve for compressed air to enter the air dump reservoir. With the dump handle pushed in and latched, the operator may safely charge the cars.

Be careful when there is a long delay after charging the air dump reservoir. Avoid these two situations: intense heat near the dump reservoir and unauthorized actuation of the dump handle. After charging the air dump reservoir, any actuation of the dump handle would empty the car. Intense heat may cause the air pressure in the reservoir to go beyond its rated pressure. When not dumping the car, reduce excess pressure by opening the drain cock at the bottom of the air reservoir.

WARNING
Never leave a charged DIFCO Air Dump Car unattended.

Use caution when charging or dumping several air dump cars. Avoid letting the locomotive main air reservoir pressure drop below the brake pipe pressure. Missing or damaged check valves could cause an undesired brake application. While this problem is rare, its likelihood can be reduced by application of the following procedures:

1. Use a separate air compressor for the dump line.
2. Charge the air dump reservoir when the cars are stopped.
3. Set locomotive main reservoir pressure as high as possible.
4. Allow ample time to charge the dump reservoir.
5. Return the dump handle to the "neutral" position as soon as the lading has been dumped.
6. Inspect the air line equipment for leakage.

C. How to Charge

Locomotives used with dump cars often have a pipe running from the main air reservoir of the compressor. This pipe can have a flexible hose positioned along side the coupler. The DIFCO Air Dump Car has a similarly positioned flexible hose connected to the dump line. On the dump line is a cut-off cock that operates similar to brake line connections. Check the cut-off cock before charging the DIFCO Air Dump Cars.

WARNING
Use of brake pipe air to dump cars can cause an emergency brake application.

DIFCO does not recommend the use of the brake pipe to charge the air dump reservoirs. Connecting the dump line hose to the brake hose reduces the brake pipe pressure. This reduction triggers the air brake valves to exhaust the auxiliary and the emergency air reservoir into the brake cylinders. Much of the locomotive's brake system air is "shot" in applying the brakes. Now all brake reservoirs must be recharged before the train can move. Most brake pipe operating pressures are well below the recommended 120 psi air pressure for dump cylinder operation.

WARNING
At no time should there be any connection between the brake line and the dump line unless approved by the manufacturer.

Moisture collecting in the air lines and reservoirs may cause difficulty in freezing weather. If excessive moisture is a problem, use air cooling coils or moisture traps. The best solution is to periodically drain the dump reservoirs, dump cylinders and air lines. Inserting alcohol into the air dump system can help stop a continued freezing problem.

II. LOADING

The DIFCO Air Dump Car is ruggedly built and designed for many years of dependable maintenance-free service. One can extend the car's service life by following a few simple procedures before and after loading.

A. Cushioning the Load

Before loading large heavy pieces of rock, put a layer of sand or crushed stone in the car. This will protect the steel dump car body from the fall of heavy material. Be careful not to drop heavy rock on the car door or body end.

B. Falling Rock

Use caution when loading the DIFCO Air Dump Car for transit over main line track. Keep the load low and centered in the car. During transit, an unstable load can shift and cause some of the load to fall. This can endanger nearby personnel or create a track hazard.

C. Sticky and Freezing Material

Certain fine or wet materials have a tendency to stick or freeze to the car end, door or floor. Clean the car daily when handling such materials. This avoids an inefficient back haul of lading. Also, stuck lading can damage the door operating mechanism.

Here are several remedies for solving a sticking problem.

1. Load a thin layer of filler material, sand or straw before loading the sticky material.
2. Spray or brush oil onto the sides and floor of the car. Waste oil seems to work well and lasts for several loadings. In very cold conditions, spray a mixture of concrete-form oil and diesel oil.
3. Dump the car as soon as possible after loading to prevent the settling or freezing of material.

III. UNLOADING

A. General Procedure

Follow these steps to dump the DIFCO Air Dump Car.

1. Be sure the dump area is clear.
2. Grasp the dump handle on the side of the car opposite the dump area.
3. Lift the dump handle clear of the safety stops.
4. Pull the dump handle out.
5. Upon release of the lading, return the dump handle to its original position.

Pulling a dump handle allows air to enter the dump cylinders on the side of the operator. The dump cylinders will extend, dumping the load away from the operator. Gravity pulls the door operating mechanism open, forming a flat extension of the body floor. The body will tip to a 50 degree angle discharging the lading at least 7'-6" away from the track center line.

Returning the dump handle quickly exhausts air from the dump cylinders. Gravity will right the car's body. The doors open and close automatically as the DIFCO Air Dump Car returns to an upright position.

The air dump cylinders are single acting. They extend to dump the car.

WARNING
DO NOT apply air to the cylinders on the dump side of the car.

The DIFCO Air Dump Car has an interlock system to prevent all four cylinders from engaging simultaneously.

B. Single-Dump Cars

By dumping one car at a time, an operator can accurately control the dumping stroke. One can regulate the amount of air put in and out of the dump cylinder. In this way, the car can actually be stopped at different points in the dumping stroke. Be sure lading is off the door when returning the car body. Lading on the door can damage the door mechanism as the door is forced close.

C. Multi-Dump Cars

This added feature allows two or more cars to be dumped simultaneously.

D. Stability on Level Track

The greatest care and design has gone into building the DIFCO Air Dump Car. The car has a low loading height and a low center of gravity. With reasonably free-flowing lading the center of gravity is always well within the rails.

The double fulcrum principle allows the body to be supported in equilibrium on widely spaced fulcrums. They prevent the body from rocking or swaying during transport.

The center of gravity swings outward as the DIFCO Air Dump Car dumps. Upon reaching the fully dumped position, the car's center of gravity is well within the rails. Should the lading be frozen to or adhere to the door, the center of gravity can move outside the rail and cause the car to derail or roll.

WARNING
The car may roll if lading is stuck on the door.

Quickly dumping the car with sticky lading can create problems. The DIFCO air dump cylinders build an "air cushion" at the end of their stroke. That can neutralize some of the momentum of the body and door. The combination of sticking lading and dumping momentum can tend to upset the car. So follow these basic guidelines:

1. Have the lading flow over the door in a controlled stream rather than a single chunk.
2. Discharge the lading early in the dump stroke.
3. Reach the end of the dumping stroke with as little momentum as possible.

When dumping sticky lading, the first dump should clear the material near the open door and the top portion of the load. When the body is partially righted, a quick second application of the dump line air pressure should free the stuck lading, allowing it to slide from the car.

Another feature of the DIFCO Air Dump Car is the cross arm construction. The cross arms tie the body to the underframe while holding the upper door closed and insuring proper operation of the door operating mechanism.

E. Stability on Uneven Track

Dumping over the higher side rail changes the center of gravity of the car and load away from the dump side. This shifts more of the load on the dump cylinders. With the increased load, the dump cylinders have a slower dumping action. Heavily overloaded dump cars can not dump.

Try the following for dumping over the higher side rail:

1. Increase air pressure until dumping action starts.
2. Dump at a level location.
3. Remove the excess lading by other means.

Warning
Dumping toward the lower rail can cause the car to roll.

Be careful dumping over the lower side rail. The center of gravity of the car and load moves toward the lower rail. This decreases the stability of the car.

Follow these procedures for dumping over the lower side rail:

1. Dump the car slowly to decrease the dumping momentum.
2. Avoid sticky materials or prepare the car for dumping sticky material as mentioned in section II-C.
3. Load the cars lightly to keep a low center of gravity for more stability.

F. Free Floating Door

The doors on the DIFCO Air Dump Car open and close automatically as the body tips and returns to its original position. The door mechanism allows the door to float on the lading, with out injury, during dumping operations.

As a safety feature, the DIFCO Air Dump Car has a Cut-off Mechanism that shuts off air after the doors have completely opened, with the body tipped approximately 35 degrees. The pressure already in the dump cylinders then completes the dumping operation. If the door does not open, sticks or hits an obstruction the Cut-off Mechanism will stop the dump cycle after approximately 5 degrees additional tipping. In case of sticky load or low air pressure the operator can overcome the spring pressure and fully dump the car by pulling on the dump handle again.

Check the lading as it dumps from the DIFCO Air Dump Car. When dumping over an embankment close to the track, most of the lading will fall over the embankment. When an embankment has been built up or cars continuously dumped in the same area, the lading may stay on the door rather than flowing off the door. In some instances the lading may be heavy enough to prevent the righting of the body. When this situation occurs leave the dump handle in the "dump" position. Monitor the car as it moves forward and the lading falls off the door and body. Push in the dump handle when the car can be righted. **Under no circumstance should the operator try to right a dumped car by applying the cylinders on the dump side of the car.**

Any attempts to apply compressed air to the cylinders on the dump side of the car would have to override the Interlock Plunger. By mechanically locking the dump handle linkage, the Interlock Plunger prevents accidental or deliberate actuation of the other dump control handle. This safety feature prevents all four cylinders from being charged with air at the same time.

G. Sticky Lading

If sticky lading is a problem, use the body preparations listed in section II-C and the dumping procedure described in section III-D. Using these steps for the first dump should remove most of the lading.

Establishing fixed dumping points allows the operator to prepare for sticky loads. Construct these structures parallel to the rails and located to contact and support the extended DIFCO Air Dump Car door.

Do not try to right an open door with lading on it! This can only cause damage to the door operating mechanism by forcing it to close around the trapped lading. Pull the car forward until the door is clear or remove the lading by other means.

WARNING
Sudden discharge of sticky lading can derail the car toward the operator.

It is dangerous if the sticky lading releases suddenly. The wheel flanges of the car may lift above the rail and the simultaneous side reaction force may push the car off the rail toward the operator. The solution is to install an inner guard rail to retain the wheel flanges on the discharge side. This helps prevent derailment of the low side wheel.

IV. MAINTENANCE

Standard freight car maintenance procedures apply to trucks, brakes and the other railway car specialties.

A. Lubrication

The DIFCO Air Dump Car door operating mechanism's pins, dump cylinder pins and dump cylinder trunnions require annual greasing to insure proper operation. The air dump cylinder requires semi-annual attention to be sure it does not run out of hydraulic oil. Add Oil, one quart at a time, in two places on the air dump cylinder. First, add oil through the inner cylinder vent (item 5 on attached drawing S-1036). Second, add oil through the air pipes connected to the air dump cylinder. Excess oil will flow from the dump valve or the push rod at full extension.

The following is a list of recommended lubrication for the DIFCO Air Dump Car:

1. Roller Bearings on wheels and axles (See AAR Lubrication Manual).
2. Center Plate - Shell Center Plate Lubricant Code number 72777 or equal
3. Air Brakes - as required by American Association of Railroads
4. Dump Cylinder - 5 gallons of hydraulic oil, Standard Oil-Ohio, Energol HPL-22 or equal. Replenish oil whenever the inner dumping cylinder appears dry. Refer to DSCCo. Parts Drawing S-1036 "Dump Cylinder Assembly and Cross Section with Parts List".
5. Dump Valves - Standard Oil-Ohio, Energol HPL-22 or equal
6. Dump Cylinder Trunnions - Bel-Ray, Molylube AC-1000 or equal
7. Dump Cylinder Push Rod Pins - Bel-Ray, Molylube AC-1000 or equal
8. Door Operating Mechanism Pins - Bel-Ray, Molylube AC-1000 or equal

B. Removal of Dump Cylinders

Torch out welded trunnion bearing locks #6482-220 at outer end of the cylinder brackets. Follow the procedures shown on the attached drawing S-935.

U S. Blue. Chicago

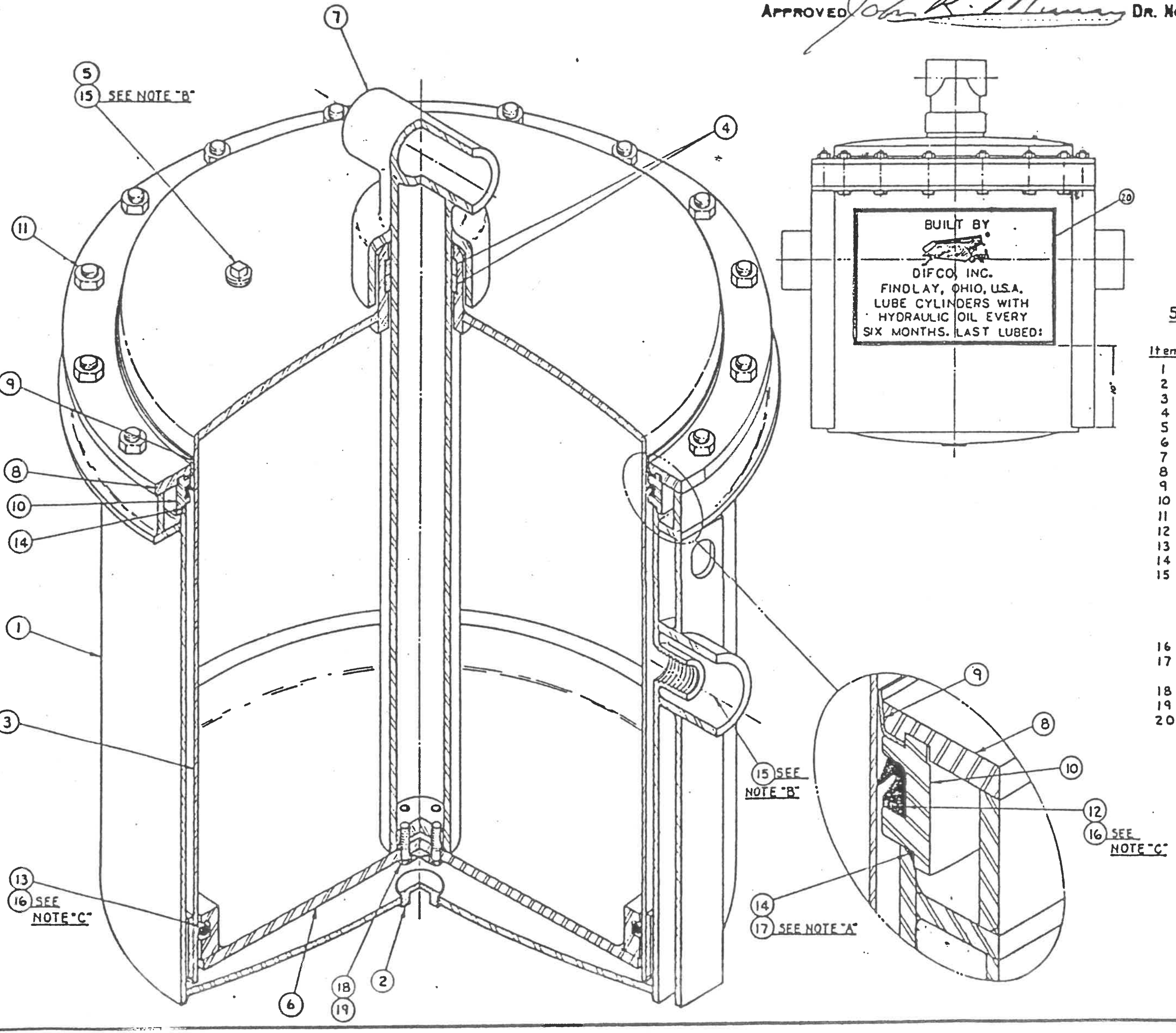
APPROVED John R. DR. No. S-1036

DIFFERENTIAL STEEL CAR CO.

FINDLAY, OHIO

STANDARD AIR DUMP CYLINDER ASSEMBLY

SCALE NONE DATE 11-4-87
DRAWN RNS TRACED CHECKED
DATE CONT. O. K.



5487-100 DUMP CYLINDER ASSEMBLY (COMPLETE) AV. WT. 1060 LBS.

Item	Part Number	Description	Qty.
1	4308-101	OUTER CYLINDER ASSEMBLY (Includes Item 2)	1
2	4679-27	OUTER CYLINDER DRAIN PLUG	1
3	5524-102	INNER CYLINDER ASSEMBLY (Includes Items 4-5)	1
4	4685-21	PUSH ROD GUIDE, BRASS	2
5	4679-23	INNER CYLINDER VENT, 1/8" STD. PIPE PLUG	1
6	5524-103	PISTON WELDED ASSEMBLY	1
7	9001-104	PUSH ROD WELDED ASSEMBLY	1
8	5524-3	SCRAPING RING RETAINER	1
9	4310-5	SCRAPING RING, BRASS	1
10	4310-6	PACKING RETAINER	1
11	4679-7	PACKING RETAINER BOLTS	16
12	S-818-15A	OUTER CYLINDER PACKING, "LIP TYPE"	1
13	5487-16	PISTON PACKING, "O" RING	1
14	4308-26	PACKING RING GASKET, 5/32" DIA. x 7'-6"	1
15	5487-24 OR	DUMP CYLINDER LUBRICANT, ENERGOL HLP-22 OR EQUIV., VISCOSITY 200 @ 100°F LOW POUR POINT -35°	5 GALS.
	8756-24	DUMP CYLINDER LUBRICANT, AMCO OIL "RYKON" No. 11 OR EQUIV., LOW POUR POINT -65°	5 GALS.
16	5487-25	PACKING RETAINER LUBRICANT No. 2 CUP GREASE	1 LB.
17	5487-28	PACKING RING HOLDING GREASE, HEAVY WHEEL BEARING GREASE	1/2 OZ
18	5524-39	PISTON CAPSCREW, DRILLED HEAD	4
19	5524-40	CAPSCREW LOCKWIRE	2
20	9080-668	CYLINDER LUBRICATION DECAL	1

NOTES:

A. PACKING RING GASKET 4308-26 MUST BE REPLACED EACH TIME PACKING RETAINER 4310-6 IS REMOVED. HOLD GASKET IN PLACE WITH HEAVY WHEEL BEARING GREASE 5487-28.

B. SELECT CYLINDER LUBRICANT PER WEATHER CONDITIONS; 5487-24 TO BE USED IN HOT TO COLD WEATHER, AND 8756-24 TO BE USED IN EXTREMELY COLD WEATHER. PUSH ROD AND INNER CYLINDER BARREL ARE NORMALLY WET TO TOUCH WHEN PROPERLY LUBRICATED.

ADD: 1 QUART OF OIL TO TOP OF PISTON EVERY 6 MONTHS OR SOONER IF PUSH ROD APPEARS DRY.

ADD: 1 QUART OF OIL TO BOTTOM OF PISTON EVERY 6 MONTHS OR SOONER IF INNER CYLINDER BARREL APPEARS DRY.

C. WHEN ASSEMBLING CYLINDER FILL GROOVES ON PISTON W/ASS'Y. 5524-103 AND PACKING RETAINER 4310-6 WITH PACKING RETAINER LUBRICANT 5487-25 TO HOLD PACKING IN PLACE.

MADE FROM DWG. 90

U.S. Blue, Chicago

DIFFERENTIAL STEEL CAR CO.
FINDLAY, OHIO

INSTRUCTIONS FOR REMOVAL OF DUMP CYLINDER FROM UNDERFRAME

SCALE ——
DATE 10-27-77
DRAWN RNS
TRACED
CHECKED
DATE CONT. O. K.

APPROVED
DR. NO. S-935

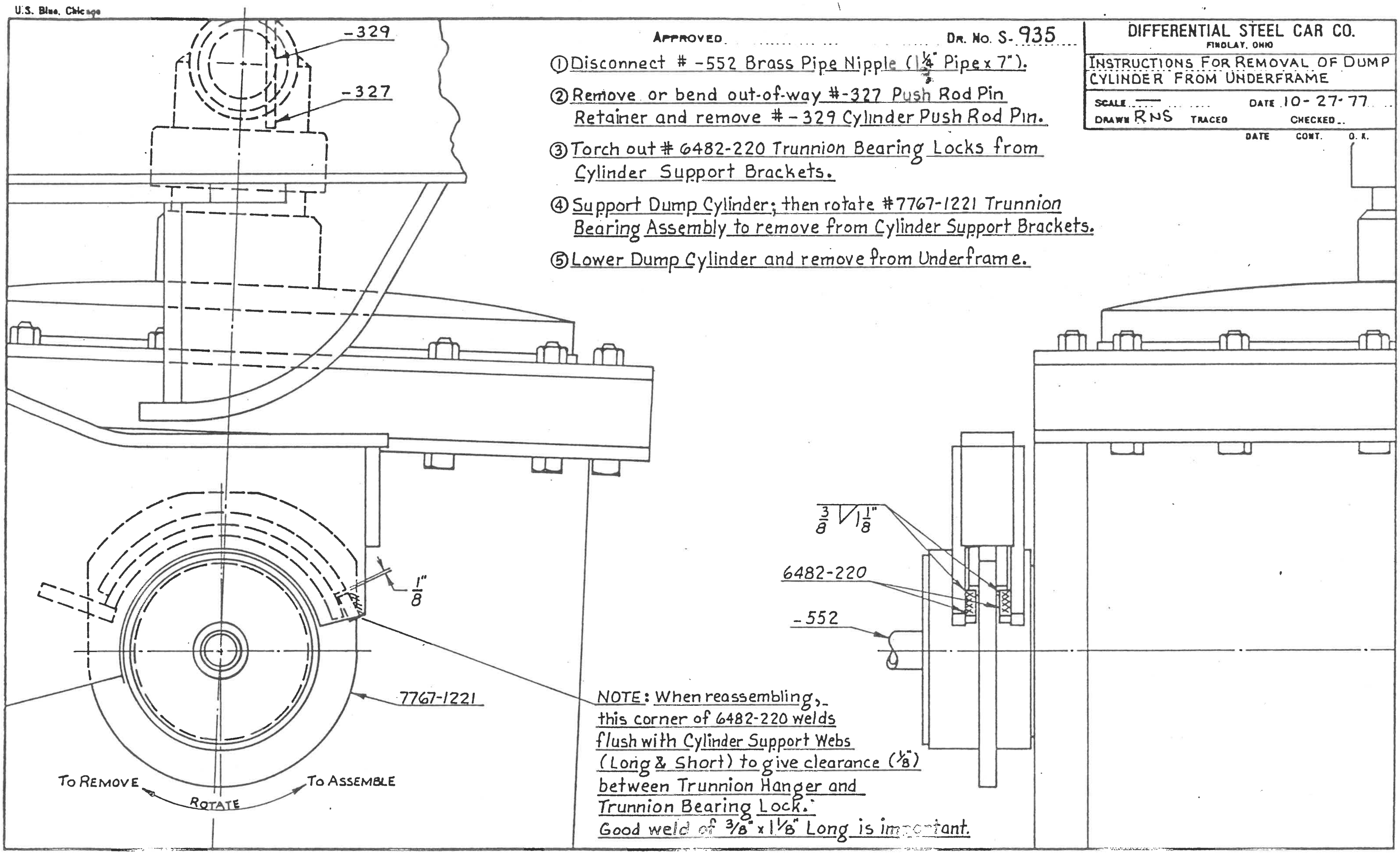
① Disconnect # -552 Brass Pipe Nipple (1¼" Pipe x 7").

② Remove or bend out-of-way #-327 Push Rod Pin Retainer and remove # -329 Cylinder Push Rod Pin.

③ Torch out # 6482-220 Trunnion Bearing Locks from Cylinder Support Brackets.

④ Support Dump Cylinder; then rotate #7767-1221 Trunnion Bearing Assembly to remove from Cylinder Support Brackets.

⑤ Lower Dump Cylinder and remove from Underframe.



NOTE: When reassembling, this corner of 6482-220 welds flush with Cylinder Support Webs (Long & Short) to give clearance (1/8") between Trunnion Hanger and Trunnion Bearing Lock. Good weld of 3/8" x 1 1/8" Long is important.